

Nuclear structure of neutron-deficient Se and Kr isotopes

Thursday, July 25, 2024 10:05 AM (20 minutes)

To investigate the microscopic configurations causing the prolate-oblate-triaxial shape transition near $A = 72$ and their possible influence on octupole as well as hexadecapole collectivity, we studied the rare isotopes $^{74,76}\text{Kr}$ and ^{72}Se , as well as stable ^{74}Se via (p, p') and $(p, 2p)$ reactions in inverse kinematics with GRETINA, the S800, and the NSCL-Ursinus LH2 target [1, 2, 3]. Our work established two regions of distinct electric octupole (E3) transition strengths with an intriguing strength increase at the $A = 72$

shape-transitional point, which is not yet understood. Additionally, we linked the enhanced electric hexadecapole (E4) transition strength in $^{74,76}\text{Kr}$ to the well deformed prolate configuration comparing to state-of-the-art nuclear density functional theory calculations [2]. In Ref. [3], we showed that $l = 1, 2, 3,$ and 4 angular momentum transfers are important to understand the population of excited states of $^{72,74}\text{Se}$ in proton removal. A comparison to $(d, ^3\text{He})$ data available for stable odd- A nuclei supports that the bulk of the spectroscopic strengths could be found at lower energies in the even-even Se isotopes than in the even-even Ge isotopes around $N = 40$.

This presentation will discuss these recent results and provide an outlook for further studies at the Facility for Rare Isotope Beams.

This work was supported by the National Science Foundation under Grant Nos. PHY-2012522 (WoU-MMA: Studies of Nuclear Structure and Nuclear Astrophysics), PHY-1565546 (NSCL), PHY-2209429 (Windows on the Universe: Nuclear Astrophysics at FRIB), by the Department of Energy, Office of Science, Office of Nuclear Physics, Grant Nos. DE-SC0020451 and DE-SC0023633 (MSU), and by the Department of Energy, NNSA, Grant No. DOE-DE-NA0004074 (the Stewardship Science Academic Alliances program). GRETINA was funded by the Department of Energy, Office of Science. The operation of the array at NSCL was supported by the DOE under Grant No. DE-SC0019034.

Presenter: SPIEKER, Mark (Florida State University)

Session Classification: A ~ 50 Nuclei